

CLAIMS

1. A plasma processing apparatus comprising a first electrode (102) on which a substrate (101; 807) subjected to a plasma process is placed and magnetic field applying means (103) for applying a magnetic field to a surface of the substrate (101; 807) to which the plasma process is applied,
- characterized in that:
- an auxiliary electrode (104) is provided on an outer periphery of said first electrode (102) to excite plasma by the auxiliary electrode (104) so as to cause electrons in the plasma to drift from a front surface (106) to a back surface (105) of said auxiliary electrode (104) and from the back surface (105) to the front surface (106) of said auxiliary electrode (104).
2. The plasma processing apparatus as claimed in claim 1, characterized in that the front surface (106) of said auxiliary electrode (104) is covered by an insulating material (902).
3. The plasma processing apparatus as claimed in claim 1 or 2, characterized in that a level of a surface of the substrate (101) placed on said first electrode (102) and a level of the front surface of said auxiliary electrode (104) are equal to each other or within ± 2 mm.
4. The plasma processing apparatus as claimed in claim 1 or 2, characterized in that said magnetic field applying means (103) comprises a dipole ring-magnet.

5. The plasma processing apparatus as claimed in claim 1 or 2, characterized in that a frequency f1 of a radio frequency applied to said first electrode (102) and a frequency f2 of a radio frequency applied to said auxiliary electrode (104) are equal to each other and phases thereof are different from each other.

6. The plasma processing apparatus as claimed in claim 1 or 2, characterized in that a frequency f2 of a radio frequency applied to said auxiliary electrode (104) is higher than a frequency f1 of a radio frequency applied to said first electrode (102) ($f2 > f1$).

7. A plasma processing method performed in a plasma processing apparatus comprising a first electrode (102) on which a substrate (101) subjected to a plasma process is placed and magnetic field applying means (103) for applying a magnetic field to a surface of the substrate (101) to which the plasma process is applied, characterized by:
exciting plasma on at least a back surface (105) of an auxiliary electrode (104) provided on an outer periphery of said first electrode; and
cause electrons in the plasma to drift from a front surface (106) to the back surface (105) of said auxiliary electrode (104) and from the back surface (105) to the front surface (106) of said auxiliary electrode (104).